[House Hearing, 105 Congress]
[From the U.S. Government Printing Office]

DEPARTMENTS OF VETERANS AFFAIRS AND HOUSING AND URBAN DEVELOPMENT, AND INDEPENDENT AGENCIES APPROPRIATIONS FOR 1999

==========

HEARINGS

BEFORE A

SUBCOMMITTEE OF THE

COMMITTEE ON APPROPRIATIONS

HOUSE OF REPRESENTATIVES

ONE HUNDRED FIFTH CONGRESS

SECOND SESSION

_____

SUBCOMMITTEE ON VA, HUD, AND INDEPENDENT AGENCIES

JERRY LEWIS, California, Chairman

TOM DeLAY, Texas	LOUIS STOKES, Ohio
JAMES T. WALSH, New York	ALAN B. MOLLOHAN, West Virginia
DAVID L. HOBSON, Ohio	MARCY KAPTUR, Ohio
JOE KNOLLENBERG, Michigan	CARRIE P. MEEK, Florida
RODNEY P. FRELINGHUYSEN, New Jersey	DAVID E. PRICE, North Carolina
MARK W. NEUMANN, Wisconsin	
ROGER F. WICKER, Mississippi	

NOTE: Under Committee Rules, Mr. Livingston, as Chairman of the Full Committee, and Mr. Obey, as Ranking Minority Member of the Full Committee, are authorized to sit as Members of all Subcommittees.

Frank M. Cushing, Paul E. Thomson, Timothy L. Peterson, and Valerie Baldwin, Staff Assistants

_____

PART 3

NATIONAL SCIENCE FOUNDATION

_____

Printed for the use of the Committee on Appropriations

_____

U.S. GOVERNMENT PRINTING OFFICE
48-932 WASHINGTON : 1998

For sale by the U.S. Government Printing Office
Superintendent of Documents, Congressional Sales Office,
Washington, DC 20402

COMMITTEE ON APPROPRIATIONS

BOB LIVINGSTON, Louisiana, Chairman

JOSEPH M. McDADE, Pennsylvania
C. W. BILL YOUNG, Florida
RALPH REGULA, Ohio
JERRY LEWIS, California
JOHN EDWARD PORTER, Illinois
HAROLD ROGERS, Kentucky
JOE SKEEN, New Mexico
FRANK R. WOLF, Virginia
TOM DeLAY, Texas
JIM KOLBE, Arizona
RON PACKARD, California
SONNY CALLAHAN, Alabama
JAMES T. WALSH, New York
CHARLES H. TAYLOR, North Carolina
DAVID L. HOBSON, Ohio
ERNEST J. ISTOOK, Jr., Oklahoma
HENRY BONILLA, Texas
JOE KNOLLENBERG, Michigan
DAN MILLER, Florida
JAY DICKEY, Arkansas
JACK KINGSTON, Georgia
MIKE PARKER, Mississippi
RODNEY P. FRELINGHUYSEN, New Jersey
ROGER F. WICKER, Mississippi
MICHAEL P. FORBES, New York
GEORGE R. NETHERCUTT, Jr., Washington
MARK W. NEUMANN, Wisconsin
RANDY ``DUKE'' CUNNINGHAM, California
TODD TIAHRT, Kansas
ZACH WAMP, Tennessee

DAVID R. OBEY, Wisconsin
SIDNEY R. YATES, Illinois
LOUIS STOKES, Ohio
JOHN P. MURTHA, Pennsylvania
NORMAN D. DICKS, Washington
MARTIN OLAV SABO, Minnesota
JULIAN C. DIXON, California
VIC FAZIO, California
W. G. (BILL) HEFNER, North Carolina
STENY H. HOYER, Maryland
ALAN B. MOLLOHAN, West Virginia
MARCY KAPTUR, Ohio
DAVID E. SKAGGS, Colorado
NANCY PELOSI, California
PETER J. VISCLOSKY, Indiana
ESTEBAN EDWARD TORRES, California
NITA M. LOWEY, New York
JOSE E. SERRANO, New York
ROSA L. DeLAURO, Connecticut
JAMES P. MORAN, Virginia
JOHN W. OLVER, Massachusetts
ED PASTOR, Arizona
CARRIE P. MEEK, Florida
DAVID E. PRICE, North Carolina
CHET EDWARDS, Texas
ROBERT E. (BUD) CRAMER, Jr., Alabama

TOM LATHAM, Iowa
ANNE M. NORTHUP, Kentucky
ROBERT B. ADERHOLT, Alabama

James W. Dyer, Clerk and Staff Director

DEPARTMENTS OF VETERANS AFFAIRS, HOUSING AND URBAN DEVELOPMENT, AND INDEPENDENT AGENCIES APPROPRIATIONS FOR 1999

Wednesday, April 1, 1998.

NATIONAL SCIENCE FOUNDATION

WITNESSES

NEAL LANE, DIRECTOR
VERA RUBIN, MEMBER, NATIONAL SCIENCE BOARD
JOSEPH BORDOGNA, ACTING DEPUTY DIRECTOR

Mr. Lewis. The meeting will come to order.

Today, we will be taking testimony from the National Science Foundation on their fiscal year 1999 budget request of $3.773 billion; an increase of $344 million or nearly 10-percent over fiscal year 1998's funding level.

Testifying again this year for what appears the last time as Director of NSF is my friend, Dr. Neal Lane. I would hasten to add that this will not, however, be the last time he testifies before the Committee.

I will have the pleasure of introducing him next year as the President's Science Advisor at the Office of Science and Technology Policy. Dr. Lane, welcome back.

Dr. Lane. Thank you.

Mr. Lewis. I might mention in connection with that, this will be Louis Stokes' last year with us. So, your exchange today probably will not be the last one personally, but in terms of a formal setting, and as you know, Mr. Stokes has had a long interest in the work of the National Science Foundation.

Also testifying this year on behalf of the National Science Board is Dr. Vera Rubin. In addition to being a distinguished member of the Science Board, Dr. Rubin is an astronomer with the Carnegie Institution of Washington.

It is my pleasure to welcome Dr. Rubin today. In a moment,

I will recognize you to introduce your other associates, Dr. Lane. In the meantime, any comments might be presented by friend Louis Stokes.

Mr. Stokes. Thank you very much, Mr. Chairman.

Good morning, Dr. Lane and Dr. Rubin. Director Lane, it is a real pleasure for me to once again welcome you and Dr. Rubin before the Committee. This will be the last time that you appear here in your current position as head of the Science Foundation.

Although the Country will lose the benefit of your experience at the National Science Foundation, the President of course will certainly continue to have your wise counsel once you take up your new duties as the head of the White House Office of Science and Technology Policy.

Your tenure to NSF has been marred by many challenging and fascinating program issues. I think you have met them forthrightly and intelligently. I have always enjoyed the personal relationship that you and I have had during your tenure in this capacity.

As the Chairman said, this is an agency in which I have some very special concerns. During the course of the opportunity we have today, this morning, this afternoon, I tend to pose some questions relative to those areas.

We will get into some in-depth discussions relative to them. I want to take this opportunity to welcome you here this morning. We look forward to your testimony.

Thank you, Mr. Chairman.

Mr. Lewis. Mr. Stokes, before proceeding, I just wanted to note for the record that the Committee's responsibility relative to the Bosnia and Disaster Supplemental, as well as the Supplemental for the IMF made it necessary to reschedule this hearing originally planned for last week.

I want you to know that I very much appreciate your cooperating with that change in schedule. It is important to us to recognize that the Committee has a great interest in your work. We did not want to have that conflict to literally ruin all of these sessions.

With that, let me call on Dr. Lane to introduce his colleagues and present whatever testimony he would like. We will include your entire testimony in the record. As you know, Dr. Lane, if you would summarize that or whatever, from there we will proceed with questions.

Opening Remarks of Dr. Lane

Dr. Lane. Thank you, Mr. Chairman.

Mr. Stokes and members of this subcommittee, I very much appreciate the opportunity to testify on the NSF budget request for fiscal year 1999. As you have indicated, with me today at the table is Dr. Vera Rubin representing the National Science Board; and Dr. Joe Bordogna, the Acting Deputy Director of the Foundation and a distinguished member of the engineering community who has led the Engineering Directorate at the National Science Foundation for a number of years. Then we have in the room the senior staff of the National Science Foundation, the Assistant Directors and the heads of the other offices who I may call on to help me with questions, who I will

not take time to introduce by name.

Before I begin my testimony, I would like to turn to Dr. Vera Rubin for her remarks from the perspective of the National Science Board. Is that okay?

Mr. Lewis. Yes, that is perfectly fine. Dr. Rubin, welcome.

Opening Statement of Dr. Rubin

Dr. Rubin. Thank you. Thank you, Mr. Chairman.

Chairman Lewis, Ranking Member Stokes, and Members of this subcommittee I appreciate the opportunity to testify before you today.

I am Dr. Vera Rubin, Member of the National Science Board and an Astronomer at the Department of Terrestrial Magnetism of the Carnegie Institution of Washington.

I would like to take this opportunity to convey to you some of the excitement and value to the nation of the research and education activities that will be supported by the National Science Foundation's fiscal year 1999 budget request.

I will also mention some of the Board's help in developing this budget in trying to understand possible effects of changes in Federal agency research programs on the broader picture of Federal support for research. First, however, I would like to thank you and this subcommittee for its strong support of the Foundation in the past.

Your continuing commitment to a strong national effort in research and education is extremely important to the NSF as we carry out our various responsibilities.

The National Science Board is a 24-member body appointed by the President for six-year terms. We represent a broad cross section of the Nation's leaders in science, engineering, and education. Since the founding of the NSF in 1950, the Board has exercised two roles; that of a national policy body and that of a governing body for the Foundation.

In many respects, the latter role is similar to that of a corporate board of directors. But as a Federal entity, we operate within the framework of policy guidance established by the Congress and the Administration.

To illustrate our national science policy role, let me mention two important reports recently issued by the Board on issues of national research and education policy. With your permission, I would like to submit each of these for the record.

[The information follows:]

[Pages 4 - 28--The official Committee record contains additional material here.]

Continuation of Dr. Rubin's Statement

Dr. Rubin. One is the Board's recent report affirming the critical importance of Federal support to graduate and post-doctoral education which offers over a dozen recommendations to strengthen graduate education for the future.

Another is the just released Working Paper on Government

Funding of Scientific Research, in which the Board urges high level coordination of the Federal budget for research and in support of that objective, the initiation of a national dialogue to develop a broadly accepted methodology for priority setting across the fields of science. I would be happy to discuss our recommendations more fully during the question and answer period.

Mr. Chairman, the budget before you has the whole-hearted approval of the Board in the face of very tight constraints on Federal discretionary spending. President Clinton has stepped forward to champion a 10 percent increase in NSF's 1999 budget.

This important commitment to strengthen our national scientific infrastructure, which I hope will be shared by Congress, will enable NSF to help maintain U.S. world leadership in all aspects of science, mathematics, and engineering. NSF funding is a vital investment in the Nation's future.

The budget you are considering today will provide the means to fund thousands of worthwhile projects across the exciting frontiers of all fields of research. It will fund important efforts to improve the Nation's education in science, mathematics, engineering, and technology.

As we enter the 21st Century and the third millennium, there is much we do not know and need to discover. Think about the state of the world 1,000 years ago when we were entering the second millennium and Leif Erikson and the Vikings sailed the oceans.

Until recently, our understanding of the very deep ocean environment has remained the same as in the days of the Viking sailors. NSF investments, under the Life and Earth's Environment theme, hold tremendous possibilities for probing the mysteries of our natural world, like the very deep oceans.

Unidentified new life forms thrive in the earth's most extreme environments in Yellowstone's Hot Springs, in the sea ice of Antarctica, the ocean depths, and they might revolutionize medicine, produce new materials for every day use, and further our understanding of the origins of life on Earth.

Over this past century, incredible advances have occurred in fields like telecommunications. In 1898, telecommunications meant Morse Code and Western Union.

Today, we are grappling with challenges unimagined at that time; how to handle the outpouring of information and data flowing from satellites, fiber optics, the web, and other advanced telecommunications.

This provides the driving force behind NSF investments in Knowledge and Distributed Intelligence. Knowledge and Distributed Intelligence, as well as Life and Earth's Environments, are exciting programs that cut across numerous fields of inquiry.

While NSF continues appropriately to promote inter-disciplinary activities, the activities require strong disciplines at their cores. The NSF fiscal year 1999 budget will allow NSF to maintain core competency while providing the flexibility to pursue emerging research opportunities.

Finally, this budget also is important for improving education in science and mathematics at all grade levels. The

Board strongly believes that we must engage all children in inquiry-based hands-on learning so that the next generation of workers, researchers, and leaders has the necessary science, math, technology, and problem solving skills to keep the United States a world leader in the 21st Century.

High standards with high accountability for student performance is the path to improved achievement in K-12 math and science. We must act on our high expectations, however, and not just declare them. Indeed, the National Science Board's response to the recent 12th grade results of the Third International Mathematics and Science Study, TIMSS, was swift.

We have created a Task Force on Mathematics and Science Achievement to consider the issues raised by the TIMSS Report. This proposed NSF budget would help keep America at the cutting edge of science.

It would enable new discovery, educate the world's best scientists and engineers and set the stage for the next millennium. It is good for the country, good for science, and good for economic growth. Most important, it is also good for the American people.

Thank you, Mr. Chairman. I will be glad to take any questions.

[The statement of Dr. Rubin follows:]

[Pages 31 - 35--The official Committee record contains additional material here.]

Mr. Lewis. Dr. Lane.

Statement of Dr. Lane

Dr. Lane. Mr. Chairman, Mr. Stokes, and members of this subcommittee, I want to begin my remarks by thanking you an the other members of this subcommittee for your very generous show of support in the fiscal year 1998 budget and in fact in earlier years.

We very much appreciate this subcommittee's assistance and bipartisan support for science and for the National Science Foundation. We look forward to working with you in this year's appropriation process.

Mr. Chairman, in the spirit of bipartisanship, I wish to join you in recognizing Congressman Stokes as he prepares to leave Congress at the end of this session. Mr. Stokes, on behalf of the entire Foundation, I want to express our gratitude for your long-standing support for the National Science Foundation.

You have been an invaluable source of guidance and direction. Your leadership will be greatly missed. I particularly want to express our appreciation for your support and encouragement of NSF efforts in science, engineering, and education, as well as our activities in the social and behavioral sciences; notably, the Human Capital Initiative and the National Consortium for Research on Violence.

I especially want to thank you for your support and continual encouragement of NSF in our activities aimed at

increasing the participation of women and under-represented minorities in science and engineering. We still have a very long way to go in this area.

I think it is safe to say that the barriers to the inclusion of under-represented minorities and women in science and engineering indeed are greatly reduced because of your leadership.

I very much appreciate that. The Foundation does and I thank you for your friendship and support through these many years. It is clear that many of these same commitments and priorities are reflected in the President's fiscal year 1999 budget request for the National Science Foundation.

The fiscal year 1999 request for NSF represents an unprecedented vote of confidence from the President. If it is enacted, this budget would be the largest dollar increase ever in the history of the Foundation, as the President noted in his State of the Union Address.

This investment will help us set the stage for a new century of progress through learning and discovery. For the coming fiscal year, NSF requests $3.773 billion; a 10 percent increase overall; over $340 million new dollars.

This investment, a part of the President's 21st Century Research Fund for America, is all about keeping U.S. science and engineering at the leading edge of learning and discovery.

Above all, we believe that these activities will enable advances and discoveries that directly relate to many of the most critical challenges facing our Nation as we approach the 21st Century.

They will help sustain stable rates of economic growth, offer more rewarding careers to our citizens, strengthen our schools, make us better stewards of our environment and point the way to healthier and more rewarding lives across our society.

major budget themes

I have attached to my testimony a more detailed summary of our budget request. So, let me just focus on a few of the major themes within our proposal. One that I want to highlight today is NSF's continued investments in Knowledge and Distributed Intelligence or what we call KDI.

Drinking from a fire hose is how many people describe the challenge of coping with the information deluge that is flooding society today. As recently reported in the San Jose Mercury News, only 7 percent, of the information expansively collected in corporate data bases is actually used.

The rest just sits there gathering the electronic equivalent of dust. NSF's KDI investments aim to turn this information deluge into a wellspring of discovery, learning, and progress. Doing this requires much more than just building bigger and better machines.

It requires addressing some of the most fundamental questions and challenges in all of science and engineering--such as the workings of the brain, how we learn, and the nature of intelligent behavior.

I have long felt that the questions and challenges of KDI are best exemplified by the neck-top computer, not the desk-top

computer. Our own brains are among the most complex, efficient, and powerful instruments on earth; we are just beginning to understand how brains operate and understand how we learn.

Understanding the workings of the brain is critical if we are to treat disorders like dyslexia, Alzheimer's, and Parkinson's. One way to better understand how the brain works is to look at it in real time in a way that does not in any way affect an individual.

NSF support has enabled the first real time magnetic resonance imaging system view of the brain. This required bringing together cutting edge work in statistics, neuroscience, and computer science.

Another facet of KDI that gets a great deal of attention is NSF's support of faster, more experimental computer and communication networks that will better link researchers and educators at colleges and universities.

We now can have virtual centers with research collaborations involving individuals in their home institutions all around the country, and indeed all around the world. One example is the NSF supported National Nanofabrication User's Network, a distributed network or virtual center that some like to describe as an arrangement of how we are transforming the way discoveries are made.

High speed connections allow researchers to collaborate and remotely use the capabilities and instruments from each of the five locations across the country that constitute this network or more accurately, this virtual Center.

You can actually now make materials and engineered devices with new properties and promise for applications. You can do it from wherever you are around the country. While the virtual center concept is an exciting example of how KDI can transform discovery, the actual research conducted over the Nanofabrication Network is probably even more exciting.

By using interconnected facilities, scientists and engineers are able to create, design, and manipulate ordinary objects like ceramics or metals, one molecule or even one atom at a time.

The prefix nano, of course, stands for ten to the minus nine or one-billionth of a meter. This is the dimension of the atomic molecular world. This is the technology for the 21st Century. The general idea of nanotechnology is not new. It has been around since Nobel Laureate Richard Feynman outlined the idea in a speech in 1959. Only recently has scientists been able to glimpse Feynman's vision by actually creating rudimentary nanostructures.

NSF's support over the years has allowed nanoscale science and engineering to go from the realm of science fiction to science fact.

One of the most notable NSF supported discoveries was the Nobel Prize winning discovery by Richard Smalley and Robert Curl of Rice University, and Harry Kroto of Sussex University in England, of a hollow form of carbon known as a ``Buckyball.''

Subsequent research has uncovered a whole range, a whole class of molecules ranging from carbon nanotubes or nanowires, only a few atoms in diameter, that could be the basis for a stunning array of new environmentally friendly carbon-based

materials never known before.

In fact, Mr. Chairman, depending on how you wrap these sheets of carbon, how tightly you wrap them and at what angle, you can get semiconducting materials. You can get super conducting materials with nothing more than carbon in these long filaments.

Some scientists even envision objects that could change their properties automatically or repair themselves. When you think about it, the idea is not so outlandish. The DNA, in fact, does that in our own bodies. DNA can replicate itself with incredibly small rates of error. Much of the inspiration for nanoscale tech science and engineering comes from the biosciences and bioengineering, making nanoscale science an ideal example of the integration of the physical sciences, the biosciences, and engineering.

These connections, across seemingly unrelated areas of science and engineering, highlight a central feature of NSF's fiscal year 1999 request--three integrating themes: KDI, which I have selected out with a few examples today, Life and Earth's Environment, and Educating for the Future.

Of course, we will be happy to talk much more about any of these themes today. These three themes provide a framework for the Foundation's investment strategy. These are each discussed in greater detail in my written statement.

Conclusion of Dr. Lane's Statement

In conclusion, Mr. Chairman, let me emphasize that the entire NSF investment portfolio sets the stage for a 21st Century research and education enterprise that continues to lead and shape the information revolution.

It addresses key national priorities in such areas as health, the environment, and nanotechnology that improves teaching and learning at all levels of education.

It commits itself to reaching out and advancing public understanding of science and technology. Guiding all of these activities is the Foundation's long-standing commitment to merit-based investments in learning and discovery that adhere to the highest standards of excellence.

A wealth of evidence testifies to the impressive social returns generated by these investments. Recent research on the economic pay-offs of research have demonstrated the contributions of fundamental science and engineering to economic growth productivity and innovation are indeed high.

As President Clinton noted in a speech given last December, half of our economic growth in the last half century has come from technological innovation. The sciences supports it.

This request marks a significant step forward for U.S. science and engineering. The requested increase of 10 percent provides the level of investment in keeping with the wealth of opportunity that science and engineering offer our society.

In addition, rigorous priority setting within our portfolio, combined with our emphasis on the integration of research and education, will help position America to remain a world leader in the information driven economy of the 21st century.

Thank you very much, Mr. Chairman.

[The statement of Dr. Lane follows:]

[Pages 40 - 50--The official Committee record contains additional material here.]

congressional support of science

Mr. Lewis. Thank you, Dr. Lane and Dr. Rubin. We appreciate very much your being with us today. Your testimony brought to mind an important memory, at least in terms of my own lifetime, first by way of your mentioning 1959, but more importantly, by the impression that was left by Dr. Rubin's rather inspiring presence as well as comments.

I remember shaving early in the morning. I could hear the television set in the other room broadcast the count down as we were about to blast off and send man, for the first time, and an American, out into space. My twin sons who are now college professors, were young kids then. We watched this.

I walked into the room and watched the very last moments of the take off. Listening to those kids talk about the apogee of the flight caused me to say, ``Wow, that is a long ways to go if one wants to keep up with those people who make-up our future.''

There is a very interesting bridge reflected in this room. I cannot help but mention that the work of this committee is inspiring because of the variety and mix of responsibilities we have that range all the way from Veterans' medical care to the fantastic work that is done by this Foundation.

I think you know that the committee on both sides of the aisle strongly supports work in science, whether it be basic research or applied opportunities. The request before us involves $3.773 billion. As I have indicated, the increase is $344 million.

It is a very sizeable increase, but I must mention that not just this committee, but the Congress has strongly expressed its support for the sciences. The Speaker has time and again publicly indicated that we should be reducing the budget everywhere we possibly can, but try to avoid reductions anywhere in requests that come forth in science areas.

That is all very, very encouraging. At the same time, we are operating in a world of budget agreements between the Administration and the Congress. We live under the budget caps; especially within the mix of this budget, Dr. Lane, because of your ongoing responsibilities.

I might mention that one of the difficulties I have in looking at this budget is that it presumes we are meeting those challenges of the budget caps by way of money or revenue that is supposed to come from a tobacco settlement. Yet, most people dealing with the practical world, in spite of what I might want to do or suggesting that, that money probably is not going to be coming forth and the people who drafted your budget at the OMB level know that as well. So, I am really asking you to try to help us as we go forward with our responsibilities with a bit of honest budgeting here.

I hoped that within our priorities, as we make tradeoffs

with VA medical care or EPA, that indeed we will be able to meet the challenge of this specific request, for it is my priority.

Let us assume we get to the point where you are advising the President down there of saying, well, maybe we cannot quite meet that requirement. I would guess that we would be first responsive to those applied medical kinds of opportunities.

Maybe the pressures would fall on the research side. So, help me begin this practical exchange that we will have over time by being pretty specific about if research is under pressure, where would you have us consider your priorities?

Dr. Lane. Mr. Chairman, we certainly understand the pressures on the budget and the President has submitted a budget for proposals for the necessary revenues as you have described.

Today, I would like to be responding in my present role as Director of the National Science Foundation on behalf of our budget.

Mr. Lewis. You will forgive me, Dr. Rubin, you know.

Dr. Rubin. Surely.

priorities for nsf's budget request

Mr. Lewis. What do we hope to do with this budget? What are we going to get out of 10-percent?

Dr. Lane. One thing I would like to remind you of is that we get about 30,000 competitive proposals to review every year. Of those, we can fund about 10,000.

There are another 7,500 or so that totally pass muster in terms of the quality of the proposals. They are right there on the table ready to be funded, but we do not have the resources to do that.

If you add up that amount of money, it is just short of $1 billion. It is about $900 million worth of fundable proposals. Well, this is a competitive process, so that is the way we ensure the standards are held high.

I use it by way of example to suggest that any additional funds that are provided NSF will fund outstanding research that has been successfully and very positively reviewed.

We would like to fund more of these proposals. With the additional 10 percent, we could fund 600 to 800 additional proposals. That would allow us to assure ourselves that we are bringing a sufficient number of new investigators, many of those being young investigators coming into the field for the first time.

They are our future in science and engineering. The second thing we would like to do with this investment is to increase the duration of the award. We are able to make awards for a period of approximately 2.4 years. Some are longer, some are shorter. The average is about 2.4 years.

We would like to extend that a bit. The number we have in mind to get to is 2.7 years. It does not sound like a lot, but collectively over the whole portfolio, it cuts down on the human overhead of writing proposals and reviewing proposals.

It makes the system more efficient. The third thing we would like to do is increase the average award size. Our average award size is of the order of $83,000 this year. Some

awards are much larger. Some are smaller. I am just giving you a sense of what we have on the average.

We would like to increase that. It is our feeling that we are underfunding some of the research projects. We would like to increase that average award size, which we would be able to do on the order of 7 percent with this budget request.

Programmatically, we would like to make these investments with an emphasis on some of these cross disciplinary areas. Life and Earth's Environment is one that I mentioned that I did not give examples. KDI is an area I did give examples.

Finally, Educating for the Future. That is all about how do we assure that the knowledge we are delivering in the classroom at all levels is in fact appropriate to the needs of these young people in the 21st Century; not what they might have needed when I was a kid, but what they are going to need for their own futures. A lot of what we are talking about in the budget request addresses that.

budget priorities

Mr. Lewis. Maybe I can get you to back up a little. I was trying to move towards a little more specific. That is, I suggested that maybe in medical accounts, for example, where there is applied research results may be looked at in terms of priority.

If research receives special pressure in terms of budget caps, then in a reduced environment, what would your priorities be?

Dr. Lane. Well, I think within the NSF budget, if we were not to get the 10 percent increase, the things I just talked about would not happen.

You might say, well gee, it does not sound quite like priorities, but I would just remind the committee that everything NSF does is core program. We fund competitively reviewed proposals.

priorities for fy 1999 funding

Mr. Lewis. Well, let me ask it another way then.

Most of your activities within the research account receive percentage increases of 10 to 16 percent. I mean, are you suggesting that the way we should look at then if there is a reduction, is we have got to be taking reductions across the board?

Dr. Lane. Well, Mr. Chairman, the increases were not made across the board.

Mr. Lewis. That was why I was trying to ask you to be specific.

Dr. Lane. They were made with careful thought about where we wanted to make those investments. My view would be that if our budget comes in lower, the relative allocations you see among the different directorates would remain the same, and we could explain each one of those.

Why is one more than another? I will be happy to answer your question about that. Those relative allocations would remain pretty much the same. The reason, for example, the Computer and Information Science and Engineering Directorate

receives a significant increase has to do in part with our emphasis on KDI for the reasons that I have described.

Even if the budget level were to be lower than our request, we are still going to emphasize an investment in that very important area of interdisciplinary activities. The same applies to Life and Earth's Environment.

This year, as a part of the $344 million increase, we requested $88 million specifically for Life and Earth's Environment. That is because we think it is important to do more research that addresses environmental concerns. So, if we do not have $344 million, we will still set our priorities in the same way. We will still emphasize interdisciplinary research in these schematic areas.

education and human resources development

Mr. Lewis. Moving just a little, Dr. Lane, from the research account which I was dwelling on, your budget also applies to education and human resources, that account, where there is a total of $683 million; an increase of some $51 million over 1998.

Let us assume that similar questions are asked about that funding, I presume your response would be similar. You would not prefer an across the board cut, but there has to be a reduction.

Dr. Lane. In the area of Education and Human Resources, let me say that, that is the account in which most of our education and human resources development activities are found.

We also present the budget by key function area because much education is being supported out of the research directorates. There is a table in the budget presentation that shows a little more accurately what the activities are that we are funding.

In the area of education and training, we are requesting for fiscal year 1999, $737 million, which is a 10.7 percent increase which shows the priority that we place on education. If one asks, why spread that around in the research directorates, the answer is we are trying to emphasize the integration of research and education.

We think improving the education at all levels and addressing the serious issue of under-representation is something for all of us, all the research directorates, all of the research community to be involved with.

Many of the priorities set in this budget emphasize research activities that involve the research directorates. I will just mention the CAREER program, which is our young faculty program. It is a competitive program which receives proposals from faculty within a few years of their initial appointment.

We require that they address not only research, but innovative activities in education. We have those peer-reviewed. We are increasing that program by 16-percent. That is an example of the way we emphasize integration of research and education.

reviewing priorities for nsf budget

Mr. Lewis. One of the points that I really wanted to emphasize in this first round of discussion is that a budget presentation is developed. You necessarily go from your own professional review to OMB for some massaging.

A part of that massage relates to the presumption of tobacco funds to flow to us. Dr. Lane, assuming that there may be some difficulty with that legislation and thereby that not be available, can I assume that you and yours will help us in reviewing those priorities to make sure that we are following lines that best reflect your priorities? We will take care of the committee's priorities. In the meantime, we will be interested in that.

Dr. Lane. Mr. Chairman, you can certainly count on our cooperation in that way. We believe the budget that is submitted reflects our priorities.

We understood that as the appropriation process proceeds, there will be continued interactions between the Administration and the Congress on the budget priorities. We certainly will participate in that.

Thank you. Mr. Stokes.

k-12 education

Mr. Stokes. Thank you, Mr. Chairman.

Dr. Lane, last month there were some press reports about the latest international math and science comparisons. For the United States, as you know, the news is not too good.

Although the United States was not dead last in the comparison, our 12th graders ranked 16 of 21 in general science, 19 of 21 in math skills. Obviously, the impact of the situation is not only felt in the classroom, but otherwise.

Equally depressing is other news. For instance, the Washington Post reports today that in Northern Virginia, there are 19,000 unfilled high technology jobs. That number is expected to grow to more than 100,000 in the next five years. If that is the situation here, one would hate to think what the situation must be nationwide.

In 1983, the National Science Board prepared a report that included an action plan to make our students first in the world by 1995. By 1991, it was obvious that, that goal would not be met.

So, President Bush and the State Governors had an education summit in Williamsburg, declared the new goal be met in 2000. It seems this issue is really bigger than the National Science Foundation.

It seems that you also still have a very key role in this whole picture. Can you just tell us how you view this whole situation?

Dr. Lane. Well, Mr. Stokes, the National Science Foundation remains very strongly committed to playing its important role in K-12 education. As you know, the Foundation shifted its gears along the way.

We used to be an agency that focused almost entirely on the gifted and talented students in science and mathematics. We will still view those young people as very important. Our programs do support their activities. Increasingly, we turned our attention to the larger challenges. That is science and

math education for everybody.

This Nation's future depends on the understanding of all of our citizens about not only what science is about, but having skills in science and mathematics in an increasingly technological world.

We remain very committed. The TIMSS tests, however long one might debate precisely what they mean are very, very disappointing.

All of these young people around the world took their test in the same year, 1995--fourth graders, eighth graders, and 12th graders. The test results are being analyzed in batches.

The first group to be released, I think, in 1996 were the fourth graders. We did pretty well internationally, in both science and math. We were better in science, I think, than in math, but still pretty good.

By the eighth grade--those results then released the next year--we had slipped considerably relative to other nations in the world. By the 12th grade, we were near the bottom, as you have described, Mr. Stokes.

Having seen the eighth grade results, in some sense it is not so surprising that we are in even worse shape with our 12th graders. That clearly means we have a serious problem. I would also remark that the efforts that we have made collectively in the nation to try to come to grips with these problems began in the early 1990s. They addressed primarily the early grades. It is possible that those efforts have begun to impact the fourth graders in 1995.

Some of the good performance that we saw of our fourth graders could well have been due to those efforts, not just of the National Science Foundation, but many efforts around the country.

Those efforts would not have touched very many of the eighth grade students in 1995. They would not have touched the 12th graders at all. The TIMSS Tests will be repeated when the earlier fourth graders are eighth graders in a year or so.

We will see whether there is some continued progress. I think we cannot wait on those kinds of test results. We have to move forward aggressively. NSF, with your encouragement, has gone boldly out on an effort to work with States and cities in rural areas, and districts, and schools to change the whole delivery system of science and math education.

I say boldly because it has not all worked. There are some good stories and they are true stories. Then there are some disappointments. I think what we are doing there is probably the hardest thing we are asked to do. It is probably the most challenging thing we are asked to do.

We try to keep the quality high. We work with the schools to ensure that they set the standards that are appropriate to their schools, cities, and districts. All we require is that they do that. Then we work with them to fund those activities.

I think we are making some progress. I think it is the right direction. We are a small part of the whole in terms of numbers and dollars, but our investments have been very highly leveraged in State funds, city funds, bonds, and in other ways. I think we are beginning to see a real impact.

reevaluation of ehr directorate

Mr. Stokes. I appreciate that explanation of your view of how you view this and how this incremental approach may be the way we have to look at it.

At the same time, I just wonder, in light of, say, the hundreds of millions of dollars that the Foundation has been spending annually on science education activities, whether you feel there is a need for some reevaluation of the science, education directorate or not.

Dr. Lane. I am sorry; reevaluation of the?

Mr. Stokes. The science, education directorate.

Dr. Lane. I would make a comment. Then I would like to turn to my colleague, Dr. Rubin.

Mr. Stokes. Sure.

Dr. Lane. I think looking at the whole organization structure of NSF is an appropriate thing to do from time to time. The Education and Human Resources Directorate, and under the leadership of Luther Williams, has continued to emphasize this integration of research and education that I talked about and has been instrumental in helping us get a larger ownership of the challenges.

So, I think it is appropriate, as Rita Colwell comes on board as my successor--a very distinguished scientist from Maryland, and I am very excited about the President's announcement--as she comes on board, I would encourage Rita to have a look at the organization with all of these changes in mind that we have seen.

May I ask Dr. Rubin to make a comment, Mr. Chairman.

Mr. Lewis. Sure.

nsb task force on math and science achievement

Mr. Stokes. Dr. Rubin.

Dr. Rubin. Thank you. I think Dr. Lane has given you a very good summary. We were all delighted with the fourth grades, less so with the eighth, and really severely disappointed with the twelfth.

The National Science Board, at its very first meeting following those results, spent a fair amount of time and with some seriousness discussing this. We have set up a Task Force for Mathematics and Science Achievement.

Our final goal is to have a draft report for our next meeting which is in May. The charge to the task force was to consider the implications of this report and to investigate what other data are available. We are taking that to mean to seriously examine how the data are gathered. The TIMSS Report is an enormously detailed survey.

All of the data are reported in satisfying detail, which enables us to look at the differences between the students abroad and in the U.S., to try and understand what category in their education they are.

It is not that we are questioning the results at all. We really want to understand the differences between students in the last year of their schooling. This is the way it was put.

So, with criteria such as age, how many courses in these studies they have had we hope that we will come out with a better understanding of what the results mean. Perhaps that

will lead us to an understanding of where we should go next.

We are also looking into the studies which have been funded under NSF auspices which have been very successful. We are trying to gather some data on what works. It may be that what works in one situation is very different from what works in another situation.

I think we feel if we could bring together a body of information that tells us what works, what students respond to, we might be able to try to understand where we should go next. We think this is a very, very serious situation for the country.

We think the future, both for science and for the country, rests in having a citizenship that knows science and knows mathematics enough to read the Washington Post and understand all of the numbers that greet you daily.

We support very thoroughly the education initiatives of the National Science Foundation. We support the budget for them.

collaboration with department of education

Mr. Stokes. You mention the budget. I note that in your 1999 budget, you have a collaborative effort with the Education Department. Do you think that this may in some measure help by tieing into our Education Department on this matter?

Dr. Lane. Mr. Stokes, we are very enthusiastic about this opportunity to partner with the Department of Education. I should say quickly that we have, of course, worked with the Department of Education and with other agencies over a number of years through memoranda of understanding on a variety of programs.

This is a larger effort. It was a result of the President's request to the two agencies to identify how we can better partner together and develop a multi-agency strategy for addressing primarily middle school mathematics.

The President is also very interested in science. His interest rose out of the eighth grade results. The President was disturbed at what he saw when the eighth graders were tested. So, he asked us to get together. We put together an interagency working group. It was primarily the Department of Education and NSF working together.

We have devised a strategy to address middle school mathematics where we think the critical problem is. A secondpartnership is in the area of learning technologies where PCAST, the President's Council of Advisors on Science and Technology, raised this issue with the President and suggested that we really do need to address what technology is being used for in the classroom.

There is no longer a question about whether you want technology or you do not, or you want computers or you do not want them. They are there. They are happening. Computers are coming into the classroom. They are being hooked up to the Internet. You have got to address the next question. How do you make sure that they are used for good purposes in terms of student learning? It turns out that not a lot of research has been done on this.

The second partnership for which we included $25 million in our request was for a partnership with the Department of Education to do basic research on the technologies of teaching

and learning. Also included are some competitive large scale experiments on technology in the classroom. I have been very reluctant to believe that technology was going to be the solution to this problem.

I think we have talked about that before, Mr. Stokes. Given the problems we have attracting people to the teaching profession, having enough teachers in the field able to deliver the courses, I believe we are going to have to figure out how to use the technology much, much more effectively to help in addressing these issues that we confront.

So, we are very excited about the partnership. We are just getting started talking about how this would be carried out.

partnerships with industry

Mr. Stokes. Thank you very much.

Thank you, Mr. Chairman.

Mr. Lewis. Thank you, Mr. Stokes. Mr. Frelinghuysen.

Mr. Frelinghuysen. Thank you, Mr. Chairman.

Good morning, Dr. Lane.

Dr. Lane. Good morning, sir.

Mr. Frelinghuysen. And others; thank you very much for being here. I thank you for your work on behalf of the National Science Foundation. I know you are off to the White House likely for new responsibilities, but I want to thank you for working hard and putting a human face on a lot of science that has heretofore been somewhat dry and too complex to understand. I think you have made for many of my constituents the whole issue of basic science, fundamental science, somewhat more human.

I appreciate your willingness to travel around the country to do just that advocating. So much of what you do is, in your own words, explosive, unprecedented, rapid, high speed, breath taking; all of those superlatives.

I would like just to play the devil's advocate for a few minutes here. In that portion of your testimony related to Knowledge and Distributed Intelligence, I would like to substitute a couple of words here.

The explosive growth in our computing power and communications connectively has brought forth unprecedented opportunities for our company.

Let me substitute here Bill Gates, MicroSoft, Gershner at IBM, unprecedented opportunities for providing rapid and efficient access to knowledge and information for studying complex systems and for advancing our understanding of learning and intelligent behavior of people and machines.

Our company's effort aims to improve our ability to discover, collect, represent, transmit, and apply information. In our company's theme, we intend going on, using your own words, to emphasize research on knowledge, networking, learning, and intelligent systems, and new challenges to computation.

What I am driving at is that there is a private sector out there that has moved forward with a fair amount of ingenuity and intelligence, perhaps from the same well source that you have been working at the National Science Foundation.

I would like to sort of ask where you interconnect with the

private sector. We know their motivation is to make money. Indeed, at times, they are willing to pour in. I am not saying that there is not some relation to economic benefit.

They are willing to pour into the private sector into some schools. Those are lucky institutions a hell of a lot of money. I was just wondering how you cross-pollinate with those types of corporate executives, and in some cases corporate geniuses.

Dr. Lane. Thank you for that question, Mr. Frelinghuysen. Let me also say I really have very much enjoyed the opportunity to be on campus with you at Rutgers in particular.

I know we made a visit there and some of the laboratories where we had a chance to see students and faculty working together on research projects. I very much appreciated your support.

I guess I will be moving toward the White House, provided the Senate gives their affirmation.

Mr. Frelinghuysen. The White House will be lucky to have you.

Dr. Lane. Thank you very much for that.

I am going to ask Dr. Bordogna to come and to comment just a minute on this issue of partnership with industry. It is a very important matter for us.

One of the five goals of our Results Act Strategic Plan has to do with making those connections between discovery, which we think we are primarily about, in the university laboratories, and use and benefit for society's goals.

centers collaborating with industry

That is largely done through coupling with industry. The way NSF goes about doing that is to encourage the science and technology centers, or engineering research centers that we support, to form partnerships with industry so that some money comes to the center from industry.

More importantly, frankly, some people come from industry and make it possible for university students and faculty to get into the industry. That is really how knowledge and technology get transferred.

All of our center programs have focused on this kind of connecting link through those sorts of collaborations. Dr. Bordogna is an expert in this area.

Mr. Frelinghuysen. The reason I asked that, because certainly all of us here are advocates for fundamental science, basic science.

Dr. Lane. Right.

Mr. Frelinghuysen. The word, obviously, is that if the Federal Government does not make these types of investments, we will not see progress because the private sector is either not interested or does not have the capability.

I just wondered whether there is in fact more capability out there knowing the drive of these corporations that they perhaps are doing a lot more basic research than perhaps we give them credit for.

interactions with industry

Dr. Lane. May I ask Dr. Bordogna to comment now?

Dr. Bordogna. The interaction with industry is eclectic. In the centers, of course, it is very formal because a center will not operate without a partnership between industry and universities.

Another issue here is big industry and small industry. Jobs are created more and more by small businesses. Innovation comes in the supplier chain for big businesses. One of the strategies is to help universities couple better with small industry.

As you have said, there is genius out in industry. We would like to tap genius from wherever we can get it. NSF prides itself in making the best investments because we do it by merit review.

We tap increasingly into industry to get reviewers from industry in balance with university reviewers. We will take the experts from wherever we can get them. Increasingly, we have them from industry. They bring a different perspective on what the issue is, too, besides being smart. Each of the directorates has an advisory committee and advisory committees have industrial people on them.

I know for a fact, just one example, in the Computer and Information, Science, and Engineering Directorate, an officer from Sunmicrosystems Laboratories sits on that advisory committee.

We have a program with a strange name called GOALI, Grant Opportunities for Academic Liaison with Industry. The idea here is to have professors spend some time in industry in a problem-oriented environment; not necessarily just to go to research laboratories, but to get right into the guts of what that industry is all about, spend some time there, and take a Ph.D. student with them.

This is a part of integrating research and education; when they come back to the university, after an NSF investment, they may have changed their view. They will have also tapped into some of the genius in industry.

I can go on. There are a variety of investments here. What I am conveying to you is that this is a serious interest of ours and that we have a strategy to develop this coupling and connection, so as the new knowledge gets developed, it flows to good uses.

industry and r&d

Mr. Frelinghuysen. Industry makes it clear to us that they do not plan to invest substantially on the fundamental end of the science spectrum where the pay-off is likely to be long-term. You never know, but likely to be long-term, given the realities of the private sector world.

Dr. Bordogna. You have made a point. It is interesting that you could well-substitute a corporate name in those KDI paragraphs and see some similarities in terms of goals and objectives. I certainly understand it. So, maybe you have disabused me of my feeling that they ought to be doing more.

We sometimes view these companies in monopolistic terms, but in reality, you can be sure they are driving these issues. I hope that we are indeed tapping into them.

Mr. Frelinghuysen. I thank you for your responses.

Thank you, Mr. Chairman.

Mr. Lewis. Thank you, Mr. Frelinghuysen. Mr. Mollohan.

education initiatives

Mr. Mollohan. Thank you, Mr. Chairman.

Dr. Lane, welcome. I join with the Chairman and Ranking Member in welcoming you to the hearing. First of all, let me complement you for your educational initiatives.

We appreciate the work in West Virginia. I know what we have done with the National Science Foundation and I think we are making some real progress. The CATS Program in particular, has been notable with the goal of retraining all of the science teachers in West Virginia.

We are very pleased with that, and are showing marked increase in the scores of our youngsters in math and science. I think we had a 6-percent increase last year.

At one point, we were under the National average and above our regional average. So, we are really pleased with that improvement and do thank you for the good work you and your staff have done.

I note that in your request for Educational System Reform, you request an increase of $2.7 million to a total of $19.8 million for the Statewide Systemic Initiative.

The program currently supports 11 States and Puerto Rico. It is my understanding that in the 1999 funding increase enables the Statewide Systemic Initiative to continue exemplary reform efforts in up to seven states.

For the Urban Systemic Initiative, you are asking for an increase of $11.6 million to a total of $86.75 million. That will target 28 U.S. cities with the largest numbers of school-aged children living in poverty, challenging them to reform their science and mathematics curriculum.

In contrast to these first two initiatives, you are not asking for any increase for the rural Systemic Initiative. It remains unchanged at $10.5 million and continues to support five implementation awards.

I am just wondering what considerations went into how you are dividing the resources between these three Systemic Reform Initiatives and why the first two are receiving increases and the rural initiative is remaining flat?

Dr. Lane. Mr. Mollohan, I would like to have Dr. Williams to comment on this. I think it has much to do with the phasing of these different reform efforts, with your permission.

Mr. Mollohan. Thank you. We very much appreciate Dr. Williams' contribution. I think his effort has been terrific.

statewide Systemic Initatives

Dr. Williams. Thank you. The answer, as Dr. Lane indicated, depends on where the three initiatives reside in our overall funding scheme.

Let me start with the States. As you will recall, starting in the early 1990s, over three fiscal years, we grew the Statewide Systemic Initiatives up to 25 States and the Commonwealth of Puerto Rico. They are five-year awards.

They have gradually phased out such that now we, as you indicated, only have 11; five of which are targeted to end in

fiscal year 1998.

One of the actions we will take as that program phases out is to roll those funds as appropriate, depending on the quality of the proposals, into the other two initiatives, including the Rural Systemic Initiatives.

Though we did not request additional monies for it in 1999, there is going to be a window because one program is decreasing and the others are increasing. So, if we have proposals beyond the five implementation awards that we have at the present, then they will be funded.

Mr. Mollohan. I am sorry to interrupt you, but, that piece of your answer makes me more curious, if I understand it correctly. If your programs are decreasing with regard to the Statewide Systemic Initiatives----

Dr. Williams. They are ending, not decreasing. It was a five-year award. So, they are ending their tenure.

Mr. Mollohan. All right. Some of those initiatives are ending.

Dr. Williams. Right; the awards are ending.

k-8 mathematics initiatives

Mr. Mollohan. All right. Then why are you requesting an increase in the Statewide initiatives?

Dr. Williams. The increases in the Statewide Initiatives are to do two additional things. As a part of the joint effort with the Department of Education of which Dr. Lane spoke, we are going to specifically focus on middle school mathematics.

Mr. Mollohan. So, it is a part of your education initiative.

Mr. Williams. Right. It is a part of the joint initiative with the Department.

Mr. Mollohan. The ``Educating for the Future'' initiative.

Dr. Williams. Right. Of the total $25 million, a small fraction of it is going to be used to network, to continue to work with the States--leaving aside the fact that they do not have Systemic Initiative awards to try to build on what, in its efforts, has catalyzed through the Systemic Initiative--to have them focus on middle school mathematics.

request for rural systemic initiatives

Mr. Mollohan. How does that reasoning relate to your lack of a requested increase for the Rural Systemic Initiatives?

Dr. Williams. They are in their earlier stages. The Rural Systemic Initiatives is the least developed of the three programs.

Mr. Mollohan. That logic makes me think that since they are least developed, they ought to be ramping up. If the others are coming down, they ought to be reducing. You are requesting increases for the Statewide Systemic Initiatives, using some of that money for educating for the future, but you are not requesting increases for the Rural Initiative. Is it fair to say you are in an increasing mode for the Rural Systemic Initiatives?

Dr. Williams. Well, it has not happened yet.

Let me perhaps answer the question a different way.

Mr. Mollohan. Because nobody is qualifying for grant money or not enough people are qualified?

proposals for rural education activities

Dr. Williams. Getting a large pool of quality proposals has been more challenging in the Rural Systemic Initiatives.

Mr. Mollohan. I am not sure what you meant there.

Dr. Williams. Getting a large number of proposals from States----

Mr. Mollohan. From rural areas.

Dr. Williams. Right. Focus on rural school districts----

Mr. Mollohan. Right.

Dr. Williams [continuing]. That successfully meet NSF's merit review threshold.

Mr. Mollohan. Am I hearing you saying that you are getting quality proposals?

Dr. Williams. No. I am saying----

Mr. Mollohan. We are not getting----

Dr. Williams. It has proven to be more difficult to get a large pool of quality proposals.

Mr. Mollohan. Okay. Is it more difficult than it is in the Urban Systemic Initiatives?

Dr. Williams. It has been.

Mr. Mollohan. Why is that, do you think?

education efforts in rural areas

Dr. Williams. I am not sure. One thing, as you know in West Virginia, in Kentucky and so forth, it is an interstate operation. It is a very complex effort we are asking them to undertake. The technology component is very challenging.

Mr. Mollohan. Because of the distance learning components involved?

Dr. Williams. Yes; right. Also, there is an enormous deficiency of excellently trained math and science teachers, especially beyond the elementary level. They have a variety of problems.

Mr. Mollohan. That is why you have the distance learning aspect of it.

Dr. Williams. Yes, but you need both. In any case, it has proven to be more difficult. We have a series of awards that are not fully implemented. We work with these school districts to try to enable them to be competitive.

So, the growth is slower, but it has been a reasoned plan, if you will, based on what I have just indicated. So, it is not a function of interest. It is a function of our expectations of the proposal load.

resources for education in rural areas

Mr. Mollohan. My initial reaction to that is why would you not apply more resources to shore up the inadequacies in some way or to build around the inadequacies, which would address those concerns?

Dr. Williams. In part, we are doing that. You are only focusing on the implementation awards. We have what we call

development awards. These are smaller grants. I think we have three of them presently for rural school districts designed to try to enable them to be more competitive; exactly your point.

I do not disagree with, I think, the major point that you are making in your observations. This is a priority area. I will take seriously your comments. We will see if we can actually do more. Doing more really means working with them to better position them to be competitive in the process.

It is greater than just providing technical assistance. It means that we have to find a way to provide some program support. I do understand what you are saying.

Mr. Mollohan. When I think about all of the remedial programs that we undertake in the Government, I cannot think of one I do not sincerely support.

One that I think we really overlook and do not focus on as much as we should is this idea of rural inadequacy; the lack of representation of rural areas in the remedial process. We have programs that specifically focus on minority populations. We have programs that specifically focus on women. But we always seem to leave out the low-income population.

We do appreciate your sensitivity and effort, which have been tremendous. However, perhaps unintentional neglect is reflected in the fact that the Urban Initiative is getting an $11.6 million increase to $86 million. The Statewide Systemic Initiative is also getting an increase, but the Rural Systemic Initiative is getting no increase.

The Rural Systemic Initiative continues to support five implementation awards. Well, I would not be content with that myself. I would say the Rural Systemic Initiatives are requesting more money in fair proportion to the other requests for increases in order to expand, like you are expanding in other areas.

I may not be right about this, but I want to raise it and invite a further dialogue after the hearing.

Dr. Lane. Mr. Mollohan, it is a really serious issue. I think maybe the reason the rural areas have not gotten the visibility is because they are not well organized. They are spread out, I guess, by definition. The EPSCoR program addressed a lot of rural America, I think, in an effective way. We feel very good about the program.

Of course, the Rural Systemic Initiatives are supposed to do that also. The point I wanted to make is not to disagree with anything you have said in shaking my head, but just recognizing that this is an area where NSF's use of the competitive peer review process makes it in some ways more difficult to do certain things because of the integrity of that process. It is extremely important for what NSF does. In fact, all of you have been very supportive of peer review and our implementation of it, which we appreciate. It may be that we just need a more creative approach here so that we do not in any way violate the competitive spirit of how we make our grants and awards, at the same time, do a better job of reaching these important parts of the country.

Mr. Mollohan. I think you really have been creative by working with these groups. I do think Dr. Williams has been very creative and out there working hard. Perhaps it is simply a resource issue. I do believe you are asking for a little more

with regard to EPSCoR.

You are dedicating more of it to the Cooperative Program, and if I am here I may want to discuss how that impinges upon the base program. I would like to follow up and talk, just generally, about the rural issue and how these programs might focus on it.

I appreciate the Chairman's indulgence for allowing me to go on a little longer beyond my period. Thank you, Mr. Chairman.

Mr. Lewis. I think Dr. Williams has a comment.

Mr. Mollohan. I am sorry.

closing comments on rural education efforts

Dr. Williams. I just want to make a closing comment. I appreciate your comments. I do recognize it is a very difficult sector, as you can appreciate. It has been exceedingly difficult for us.

Dr. Lane's comment is the one I was attempting to make. I am extremely interested in it. I recognize the societal cost of leaving unaddressed all of the very large number of students.

As you implied, it is a very complicated problem. It is one issue in Kentucky. It is quite a different issue if you are talking about the Upper Plains where you have the complication of State schools, the Bureau of Indian Affairs schools. It is a major challenge. I would like to follow up, if you desire.

Mr. Mollohan. We have got to get to all of those people. Thank you, Mr. Chairman.

Mr. Lewis. Thank you, Mr. Mollohan, for that interesting perspective. Mr. Walsh.

enabling teachers

Mr. Walsh. Thank you, Mr. Chairman.

Good morning, Dr. Lane.

Dr. Lane. Good morning, sir.

Mr. Walsh. It is good to have you in this morning and all of the members of your terrific team. I would like to join my colleagues and I certainly associate myself with the remarks of Mr. Frelinghuysen, and thank you for the service that you have provided to the country in this very important role.

I think the White House will be very well-served by bringing you in as their advisor. I think your influence has already been shown in the emphasis that the President put onscience in his State of the Union Address. So, I wish you all success in your tour of duty there.

Dr. Lane. Thank you, Mr. Walsh.

Mr. Walsh. You are welcome. You know, I was listening to my colleague, Mr. Mollohan from West Virginia, talking about rural--the emphasis on trying to bring science into rural schools. The thought occurred to me, and just to throw it out for comment, if you would like. We have a school in up-state New York. It is Kato Meridian School. It is a very small little rural school district.

There is one individual, Earl Billings, who is a science teacher.

He has developed year-after-year a program with the

students to produce and involve themselves in the solar race, the solar powered cars, and they win almost every year.

They beat MIT. They beat Cal tech. They beat Michigan. They beat everybody. In any event, this is the power of one individual, just one teacher, to get young people involved, to get them interested in engineering and science, to show them the results of their work, to show them the discipline that is involved.

It is really remarkable. I asked him how the other schools that they race react to them. He said, they do not talk to us. He said they have to go back home and explain why some up-state New York High School from God knows where beat them.

It is truly remarkable what one individual could accomplish. I just think of it maybe in terms of sending missionaries around the country, especially into rural areas, finding a way to get these bright motivated people into these schools for a year or two just to set-up that standard of excellence in science, in engineering, and sort of spread the Gospel.

I do not know what is being done. Maybe they are already doing something like that. I do not know if the Congress could think about doing something like that, supporting that sort of idea.

master teachers

Dr. Lane. Mr. Walsh, we are very much with you on this. We are trying a few things. Maybe Dr. Bordogna could comment on this.

Dr. Bordogna. Yes, I would like to comment on it. We talked this morning about the investment in education, K-12. We did not talk about how we are doing it. The most important investment is enabling teachers.

What you are saying is one example of a lot more we would like to see. If we enable the teachers, a lot can be done through the power of one individual. Thus what you are proposing sounds very exciting.

We will take the idea back with us, having master teachers--and that is a word that is used in the school systems--funded in this way to move around the country and spend sabbaticals somewhere, as is done in universities.

Mr. Walsh. That might be a great idea to help them cover some of their doctoral costs along the way.

Dr. Bordogna. The math community has also come to us saying, look, why do you not make it possible for young mathematicians as they are getting their Ph.D. to possibly become interested in K-12 education or spend some time in K-12 education? Maybe in their post-doc years you can make the connections.

We have some experimental programs in that direction as well. The value of a single person is just extraordinary.

Mr. Walsh. It is remarkable.

Dr. Bordogna. It has happened in our own lives.

Mr. Walsh. The kids that this individual works with, I think in the nine years I have been here, from that one high school, I have appointed two or three of those kids to either Annapolis or West Point that drove the car, or worked on the

car, or whatever. They are going to all of these schools that they beat in the race.

Dr. Bordogna. I would like to add one more comment to this.

Mr. Walsh. Yes.

scientist and engineers as resources in the schools

Dr. Bordogna. This is something we have been thinking about and starting to do, but it is not very visible. That is, involving the engineering and scientific community all over the country. There are scientists and engineers in every school district.

What we are doing, and we are vigorously talking about this to leaders of those professional societies who oversee this group of professionals, is to train them as a resource for the school teachers. So, resources, materials, and enabling the teacher is the focus. You have added another dimension to it.

higher education in the united states

Mr. Walsh. Obviously, this TIMSS Study that Dr. Rubin talked about showed that we are lacking. We have, I think everyone in the world will agree, that we get the best and the brightest to come here for post-secondary education, but how long can that standard be held high if what is feeding that program is not at the level that it should be?

Dr. Lane. It is remarkable, given the situation in K-12 education, that our system of higher education remains the greatest in the world. It does beg precisely the question that you ask. How long can we continue to expect that to be the case? I think that is a serious problem.

Also, we talked much about the cost of higher education. Some of that has to do with trying to bring the young people along who arrive as freshmen on the campus not having had adequate high school education and middle school education.

The work the Board is going to do in answering the questions with regard to TIMSS that Dr. Rubin talked about is very important, but some of the answers are pretty clear. If the kids do not take the courses, and even if the courses were offered, if the teachers are not there to teach physics and advanced mathematics, then you know some of the issues that have to be dealt with before you can expect to make progress. So, we know some of the things that are problems. We just do not quite have the solutions yet.

partnerships for advanced computational infrastructure

Mr. Walsh. I have a couple of specific questions I would like to ask regarding the partnership for advanced computational infrastructure and research. This is something that we had a rather vibrant discussion about last year.

I never realized how being in a room full of scientists, how big their shoulders get when they are arguing a point. I was really impressed with the strength of the arguments. I was really fascinated by the whole process.

Specifically, with Cornell, they were obviously disappointed that they were not a part of the next step in the

super computer project. I think, you know, ultimately the agreement that the gentlemen's, gentle persons' agreement, that was made with them regarding the future of their science.

They do have wonderful science there. It was a good agreement. I just wondered how you see this program working and how the partnerships have developed with the two centers.

Dr. Lane. Well, the PACI effort is, I think, an extremely important one that I believe we made clear in our earlier discussions on the matter. The NSF is strongly committed to this new kind of partnership. It is moving along extremely well.

The transition has been quite smooth. We do have the agreements in place for the phase-out of the centers at Cornell and Pittsburgh. We appreciate the cooperation of those institutions as we were finally able to arrive at those agreements.

We had many discussions with the presidents of those institutions. They are outstanding universities. They are very important from NSF's perspective because we have many excellent projects at these universities.

So, we feel very good about the partnership. We have in place, in terms of computing power, the capacity that we had at the latter stage of the previous Centers program. That was a fairly smooth transition.

We would like to have grown the capacity more rapidly. It was resource limited. We expect in future years that we will be able to deliver many more powerful supercomputer cycles than we can at the present time.

There are no major problems that we are aware of in connection with the transition. The researchers have shifted over smoothly, to the best of my knowledge, in terms of moving their data and getting their codes running on the new machines.

As we anticipated, these are working on a much larger variety of hardware systems taking advantage of the power of these new approaches to computation, and working at many of the partner institutions, as well as the central sites. Dr. Bordogna has observed this as well. Do you have anything to add?

Dr. Bordogna. I think what we see here is sort of a new way of doing this thing with both more powerful computation techniques and capabilities, and more accessibility by more people who have genius, as you have put it.

transferring data at paci centers

Dr. Lane. I think the only problem I am aware of is just how hard it is to transfer a lot of data from one place to another so we can get everybody up. The partnerships had hoped to do some bulk transfers of data.

They have done some of that. In the cases of some of the centers that are phasing out, there is a reluctance. People simply want to be more cautious about whose data is whose.

So, they are systematically transferring the data for each investigator. We are not aware that there are any serious problems, but I wanted to be sure you knew that there is that issue in the transition.

paci partners

Mr. Walsh. You had discussed the possibility of more than 60 partners. Where are you with that? Are you at that level?

Dr. Lane. Yes. I think that is correct.

I just talked with one of the leaders of the San Diego PACI just the other day and noticed they are fully on board. The numbers that we want are large. They are fully enabling that. They are getting very excited by it.

knowledge and distributed intelligence

Mr. Walsh. One of the issues that I know Cornell discussed with you and maybe Mellon, too, the direction that they were going, that they wanted to go, was a little different than what you had wanted the PACI Program to do.

In the conversation you had suggested that the Knowledge and Distributed Intelligence Program might fit better into what they were trying to do. Did that in fact come true?

Dr. Lane. That program announcement is out. There is a competition underway. It is a very broad area of research. It is really reaching out for the very best ideas of individuals and institutions.

Mr. Walsh. So, that will be competed also just like the others.

Dr. Lane. It will be competed. It is underway right now. In fact, it is very broad, but it has a couple of key areas, one of which is New Challenges in Computation.

Mr. Walsh. Thank you very much.

Dr. Lane. Thank you, sir.

Mr. Lewis. Thank you, Mr. Walsh. Ms. Meek.

hurricanes and earthquakes

Ms. Meek. Welcome Dr. Lane and the rest of NSF. I am pleased to see that you did get a recommended 10-percent increase in your budget for the upcoming fiscal year.

I think that NSF deserves it from the productivity of this agency. I am very pleased to report that your relationship and your work with some of the minority institutions, particularly the largest one in my District, Florida International University, in Miami, is succeeding very well.

Thank you for that. I have visited them. Those projects and programs are working very well. My question has to do pretty much with hurricanes and disasters. After Hurricane Andrew, there was a lot of discussion by a lot of the agencies and the National Hurricane Center.

I think I contacted you about it. In spite of the large population of hurricane related incidents, they seem to still think that more of your research is directed toward earthquakes.

It is that kind of sibling rivalry. Would you tell me a little bit about what has been done in terms of research in hurricanes, if it does not take too long?

Dr. Lane. Ms. Meek, it is very nice to be with you today. I appreciate your strong support for what we are doing. I appreciate the feedback on the success of our partnerships in

institutions in your State.

I would like to ask Dr. Corell to answer specifically for hurricanes and earthquakes. Let me just mention that one of the issues is we do have a couple of specific centers with earthquakes in their title. They do earthquake research.

You get some natural visibility. We have a large scale climate, global climate, and regional climate effort underway that relates to hurricanes. May I ask Dr. Corell to comment?

u.s. weather research program

Dr. Corell. Thank you very much.

The NSF has joined forces with NOAA and NASA and ONR to implement what we call the U.S. Weather Research Program. It is a program that is designed to bring together the results of basic research at NSF and the more targeted research of the other agencies to do several things.

One, to strongly increase our capacity to predict quantitatively precipitation, which I think you can understand is a really powerful part of not only hurricane issues, but others such as those we see in California with the El Nino.

Secondly, it is, in the coming year, targeted at hurricane intensity prediction and track prediction, both of which are terribly important to folks in Florida and others along the East Coast who are exposed to these really severe weathers. Being able to predict landfall is a really difficult problem.

These four agencies now have this. We are one of the leading agencies in working on this problem of landfall prediction for hurricane tracks and intensity. So, we are optimistic that we are going to get to do a better, better job on that.

NOAA, as you know, maintains a major program and effort in that regard. NSF, NASA, and ONR are pleased to join forces with NOAA to try to expand our knowledge in this area. We have asked for a modest, but important increase to help fund that effort.

human aspects of natural disasters

Ms. Meek. I think that is good because there is a paucity of data regarding what happens to people as a result of these natural disasters. One example of that is--I just do not know how much attention you are paying to the behavioral sciences, in addition to the physical sciences which you normally look for.

I wish that you would focus some of your research in that regard. This was notable to me after the last disaster in Florida. Many of the people that were affected by that disaster were very poor people.

They lived in trailer parks. They lived in homes that were almost like shanties. I am just wondering whether I am saying that you really need to focus some of your research on the kind of effects would those natural disasters have on those people. I guess I am saying that there is more to research than the physical part of it. The behavioral one; I would like to see something done on that. I am just wondering if in your budget request you have thought about that.

Dr. Corell. Yes, we have. It is an area in which we should

place additional attention. I would note that in working with my colleague, Bennett Bertenthal, who heads up the Social, Behavioral and Economic Sciences Directorate at NSF, there is increased attention to the human aspects of not only hurricane issues, but other natural disaster questions.

Also, under the leadership of James Lee Witt, the head of FEMA, connection between FEMA's programs and activities and research efforts have dramatically increased over the last year or so.

We are delighted to have them as a part of the research program. They are not formally a part of the weather program, but they are formally a part of many other of our research activities that impact on global, regional, and environmental science.

We are pleased with that addition. In fact, they are beginning to support some research in that area to build the connections that you have described of the total picture of not only the physical aspects, but the consequences of large scale natural hazards and disasters.

Ms. Meek. I would like, for the record, if you could supply me and the Members of this subcommittee with some of the instances of your research in this area. I think it will help us in making decisions as to how we can even reflect on some of the things other Members have mentioned this morning; the social implications, the poverty of the people, and the gender.

If you watch some of the people who are interviewed on television, they are usually poor people. They are usually women who are left with their families without places to live. I guess I am asking if you will just show me some instances of where you are going into that research and funding some proposals that will assist in this effort.

Dr. Corell. We will be pleased to do so. We will give you a comprehensive picture of this hurricane issue as well.

[The information follows:]

Hurricane Research

The National Science Foundation supports a broad array of research related to both the physical aspects of hurricanes--hurricanes as weather--as well as the social and behavioral aspects of natural disasters--how humans react to and cope with natural disasters.

Research associated with the physical aspects of hurricanes is primarily supported as a part of the coordinated, interagency U.S. Weather Research Program (USWRP). One of the three primary goals of the USWRP is to improve hurricane track prediction and forecasting--improving our ability to accurately predict storm tracks that will enable the nation to better prepare for these major weather events, thus reducing the impact of such storms. Other research on the physical properties of hurricanes includes studies of rainfall patterns and efforts to increase our ability to predict rainfall amounts, as well as examinations of hurricane genesis, development, and dispersal.

In addition, significant research has and continues to be supported which is specifically targeted toward understanding the human dimensions of natural disasters. Following Hurricane Andrew, an examination of household pre-impact prepared-ness and post-impact restoration activities, with a focus on the role of ethnicity in disaster response and management, was undertaken. Other research being supported includes: an examination of the breakdown, maintenance, or reorganization of social control in disaster settings; research on the

human perceptions of and responses to catastrophic events, including individual coping strategies; inquiry into the effect of social networks and community response on an individual's response to a natural disaster; an examination of the psychological and physiological reactions to stress produced by a natural disaster; an assessment of ethical issues in the management of natural disasters; and research on risky behavior and the purchase of disaster insurance.

Ms. Meek. All right. Thank you so much.

Mr. Chairman, do I have time for one little, bitty one? I will wait.

Mr. Lewis. Let us see. You have taken just about as much time; about two minutes short of the last person.

Ms. Meek. Well, I certainly do not want to go any longer.

Mr. Lewis. You have got two minutes.

Ms. Meek. I will cut off right now, Mr. Chairman.

Mr. Lewis. Ms. Kaptur would appreciate that. Ms. Kaptur.

extramural research

Ms. Kaptur. Thank you, Mr. Chairman.

Welcome, Dr. Lane, Drs. Rubin and Bordogna. It is good to have you back before the Committee. I wanted to ask if I look at the total amount of NSF dollars under your jurisdiction, what percent of those would be used to fund in-house research versus research that is done outside NSF?

Dr. Lane. Ms. Kaptur, all of our funding is through this competitive process of peer review and proposals. All of the organizations and individuals we support are extramural. We do not actually have any laboratories that are NSF laboratories.

We do not operate any facilities or research laboratories ourselves. We do this with partners. So, all of the laboratories are out in the universities and the colleges. All of the facilities like telescopes, ships, and instruments of other kinds are operated through universities or consortiums or other organizations.

Other than roughly 5 percent of that money that we use to do our business, all of the other money goes out through grants and agreements.

R&D funding for universities and colleges

Ms. Kaptur. Of the funding then that goes out, what percent of that would go to universities as opposed to other research entities that exist?

Dr. Lane. The vast majority goes to universities. Let me ask Joe Kull if we have a crisp number. We can supply a better number for the record. There are a very small number of institutions that are not universities, some not-for-profit institutions. There is the SBIR grant program which mandates that 2.5 percent, I believe, of our R&D budget goes to companies.

I now have some numbers in front of me that say, of the total R&D support--that does not include our education budget, but what is classified as R&D, that request in 1999 is $2.857 billion. Of that, we are projecting that $2.233 billion would go to universities and colleges.

Ms. Kaptur. That is the research budget.

Dr. Lane. That is the R&D budget. Then the only thing that leaves out is some of the education activities. That is split between universities and colleges and K-12 systems, cities, and States through programs such as the Systemic Initiatives.

distribution of nsf funding

Ms. Kaptur. In past years, I have asked if I were to look down the list of which universities receive the bulk of NSF funding, my guess would be that because projects last over a number of years, that there are certain major players that always receive the largest share of the dollars. Is that impression correct, institutionally I am talking about; not individual researchers?

Dr. Lane. That is correct.

Ms. Kaptur. What information can you provide to the record to show that NSF is making an affirmative effort to work with universities that might not be in the top 10 or the top 20?

This would include efforts to have professors from some of these other schools serve on the peer review groups that are used to make selections. In other words, what efforts are being made to try to diversify in the same way as you are working on Knowledge and Distributed Intelligence?

What effort are we making to try to distribute the benefits of NSF to worthy institutions that might not be in the top 20 of the largest traditional institutions?

Dr. Lane. Ms. Kaptur, there are many efforts. I could give us some examples. Then we certainly will supply a more complete description for the record.

The EPSCoR Program we talked about earlier, of course, was specifically designed to address the lack of infrastructure in certain institutions in States where there had not been a lot of Federal money.

The problem was felt to be that outstanding faculty go everywhere. If they do not have the support structure, it is not so easy for them to be competitive in a peer review process. It is not a matter of the peer review process being biased against one or another institution.

It really has to do with whether an individual can write a competitive proposal and has the laboratory in place, for example. That is a very important issue. The EPSCoR Program was put together to address that.

As I indicated earlier, we are very pleased with that program. We have seen considerable success of that program. The PACI partnership is another example. It turns out the two principle sites are California, one of the previous supercomputer centers, San Diego and the second central site is in Illinois, also one of the previous supercomputer centers. Many of these partners now in the larger supercomputer effort are in States where the institutions are not in the top 20 and in some cases, not in the top 100. There are a number of other examples.

needs for technological training

Ms. Kaptur. If I might share with you an insight and this

does not even relate to my own District, but it does relate to another county in Ohio. I will just get you and your people to think about this. We know knowledge is power. We know that more education yields a greater productivity in many ways.

One of our major counties came in to see me and they have no institution of higher learning in this particular county. They have just had a major shut down of the last Thunderbird Plant in America.

There will be over 5,000 workers that are permanently terminated. I can think of a number--Thompson Electronics just did that over in Indiana. There are a lot of places in the country where in spite of the economy supposedly lifting all boats, these boats are sinking.

I think of the research that NSF does, I think of some of the resources you can make available, I know Dr. Bordogna has a special interest in this as well. Perhaps NSF can identify some places that are truly academically short and facing incredible human and economic problems in some of these places.

I do think that relationships--what happened in this particular situation actually, one of our major universities, the engineering school, the University of Toledo has now linked to this one county that had no higher education institution.

Prior to that I did not realize it did not have an institution of higher learning to develop some engineering programming to try to help many of these workers. I might encourage you through whatever means you have every year to perhaps look at ten places in the Country on a demonstration basis, someplace where economics are being hollowed out.

I think our government, whether it is run at the executive level by Republicans or Democrats has been very, very inadequate in terms of dealing with the residue of economic dislocation.

Many times that is coupled with a lack of educational and scientific presence. To some extent, you might be able to marginally help in some of these areas. I would just encourage you. I do not know everything that you are capable of doing institionally.

I know the Department of Labor has plenty of charts they can show you. I just think that for awhile I attended MIT, in Boston. What an incredible place, the ability to generate jobs and so forth.

I have also been in Lorain County, Ohio and some of the Indiana counties. It just seems to me that we need a better way to connect people who have abilities, but they have very few educational resources to draw them up.

Some of your programs have the possibility of doing that. Especially some of these big-time hitters. I remember when I was first elected, and I will not say who it was, I did not even know that the phones connected in our office in the Longworth Building. One of the major hitters was in my office, already with their little bag ready for business, and I mean a major university.

They know the system better than I did. I just think that many times it gets pretty comfortable in some of those environments. So, anything you can do to better connect your resources.

I am not asking for the world, just a few efforts, to try

to locate some of these places. We have to give people hope; people who believe in the work ethic, people who have been out there. Then the whole rug is pulled out from under them.

technology revolution

Dr. Lane. I appreciate your comment, Ms. Kaptur.

I should have added what I think is something that is going to change society and already has in major ways. That is this technology revolution that we talked about.

As we connect up the different parts of the world electronically, if we do that intelligently, if we do that in a way that makes the system accessible to everybody wherever they are, we are going to be able to use that technology to lower some of these boundaries.

Some of them are geographical. Some of them are economical. Some are cultural. Some are varieties of different kinds of boundaries. The next generation internet program is a multiagency program that NSF participates in. It certainly reaches more than the top 10 or 20 institutions. It will eventually reach many, many institutions across the country in the way the PACI has done.

I think we just need to keep the focus on reaching out and realize that smart people and important people are born everywhere. Many of them decide to live their lives everywhere. If the Nation is going to be strong, then parts of the Nation have to be strong.

We have a role in that. We have a role to try to help build with this competitive process, the strength of all of our institutions. We are stretched pretty thin sometimes, but we are willing to try new things.

We just have to be creative and ensure we have the right kinds of programs to excite the people in these regions and get their best ideas and then provide some support. We appreciate your comments.

funding received by top 20 universities

Ms. Kaptur. If I could just ask for the record, if someone in the Foundation could provide to us for 1980, 1990, and perhaps this past fiscal year from your entire budget, maybe the top 20 universities that benefitted in each of those years and how much money they received.

I would like to look at a trend over a period of time and then make a judgment on the rest and which other institutions have been invited to participate at the table. I am just very curious about that.

Dr. Lane. We will be very pleased to give you a comprehensive picture of that. I think it is important to look at the whole thing.

[The information follows:]

[Pages 77 - 78--The official Committee record contains additional material here.]

outreach through advisory committees

Dr. Lane. Also, I did not respond to your question specifically about advisory committees and the reviewers. We have made significant efforts to reach out in those communities, sometimes to the point that when we call somebody up, they say leave me alone. You are always dragging me up there.

My view about that is, I am going to call you again, and you might tell me no, again, but that is the only way we can really, I think, be more inclusive in the way we do our business; but we will provide you with the data so you can see for yourself.

Ms. Kaptur. Mr. Chairman, do I have time for another question or not?

Mr. Lewis. I think maybe we had better move on, Ms. Kaptur. I really appreciate the line of questioning, though, that you were involved in. It should be a priority of the Committee. I would appreciate you following through on it as we go forward in the next year as well. Mr. Price.

advanced technological education program

Mr. Price. Thank you, Mr. Chairman.

Dr. Lane, let me welcome you and your associates to the Subcommittee and add my congratulations also on your new appointment. I believe Federally-assisted science will be strengthened with you at the helm of OSTP.

As I mentioned last year at this time, this hearing is very important to me because of the number of NSF funded projects in North Carolina. In the three research triangle counties alone, there are nearly 350 national science foundation-funded projects. I do not think too many other Congressional Districts in the Country could make that kind of claim.

So, we have a large stake in what you do. We are very grateful for your leadership. In the limited time we have, I would like to focus on the Advanced Technological Education Program, the main program through which the National Science Foundation relates to our community colleges.

I came back to Washington after Congress adjourned last fall to address a gathering of ATE award winners. Dr. Lane seeing you at that event and hearing what you said at that time underscored the importance that NSF has put on this program.

I think you have done a great job of developing this program, expanding its reach, and disseminating the results so that community colleges across the Country benefit. It is very exciting to see the way the community colleges were using these rather modest NSF awards to improve science, math and technology curricular and teaching methods.

This is a program that I got started with the help of many others six years ago. Ms. Kaptur, for example was an original co-sponsor of the ATE Program.

Last year, our subcommittee increased the funding for this program to $31.2 million, that was $2 million above the President's request. I want to reiterate my thanks to Mr. Lewis and Mr. Stokes for their assistance in getting this done.

Now, this ATE Program is designed to help community

colleges improve their science, math and technology education programs. In addition, it creates a partnership between NSF and the community colleges similar to the one that has been so long available to the four-year institutions for the development of curricula and teaching methods in the upgrading of this Country's advanced technology training programs.

As we all know, that is where most of the jobs are. That is the kind of training most jobs require. I visited one of those research triangle firms a few weeks ago and was told that 86 percent of the jobs at IBM in North Carolina require two years or more beyond high school.

That is where the jobs are. That is where the training is going to have to be strengthened. North Carolina has received three awards from this ATE Program over the years. I, of course, hope that our State community college systems, and the individual institutions will successfully compete for more awards this year.

For fiscal year 1999, the President has requested an increase in ATE to $33.4 million. I certainly applaud this request. I notice that your budget explanation indicates a plan to use a portion of this increase for an additional center of excellence.

How many centers are there currently? Do you have an idea of what area of research a new center might focus on?

Dr. Lane. May I ask Dr. Williams to respond?

Mr. Price. Yes. Dr. Williams, we are glad to have you here. We appreciate the very close involvement you have had with this program and your role in developing it.

Dr. Williams. Thank you. Currently, there are ten Centers. We expect to add two this fiscal year. The 1999 request is for an additional one.

focus on new ate centers

Mr. Price. Do you have any plans at this moment for the focus of those new centers?

Dr. Williams. No, we do not. All of the Centers are focused around a given area in, as you know, science, engineering, technology, bio-technology, environmental technology, manufacturing and so forth.

We have shared with potential applicants the areas or the focus of the existing Centers to suggest that they think about others; though, in fact, there could be duplication.

What I imagine would happen, Mr. Price, is that in communities where there are already several ATE grants, individual grants--and across community colleges--people are interacting with each other. Those would probably be best positioned in terms of the planning process to compete for the center. We have not prescribed the area.

Mr. Price. So, the areas that you focus on will depend on the merits of the applications.

Dr. Williams. And the interest, and the capabilities of the two-year institutions, plus their industry partners who have a substantial role in defining the nexus of the Center.

Mr. Price. Well, I think it will be helpful for the record if you would just provide a brief listing of the existing centers and their foci of attention and also indicate the time

table for bringing these new centers on-line.
Dr. Williams. I shall.
[The information follows:]

[Page 82--The official Committee record contains additional material here.]

Funding Rate of ATE Program

Mr. Price. Last year, also you provided for the record funding rate information for the ATE Program. Those numbers indicated that the rate had decreased, in fact, partly of course you are getting more applications.

The rate had decreased from nearly 40-percent in fiscal year 1995 to 30 percent in fiscal year 1996. Can you tell us what the funding rate was for fiscal year 1997? I wonder if you could give us an estimate.

If we were to increase, say, the funding to $35 million, would that be sufficient to bring that funding rate back to that 40-percent figure that we experienced in fiscal year 1995?

Dr. Williams. The funding rate for fiscal year 1997 was about equal to the previous year; it is low 30s. You indicated why there was a significant decrease in the success rate. Fiscal year 1995 was the first year of the program.

So, the budget, relative to the number of competitive ideas, explained the result and 30 percent has been true for the last several years. Your question of what impact an additional $2 million would have on the success rate--perhaps I should provide it for the record.

Mr. Price. To frame the question a little differently, what would it take to bring us back to a 40-percent success rate?

Dr. Williams. Then most assuredly we would have to provide that for the record.

Mr. Price. All right.

Dr. Williams. That would take a long period to think about it.

Mr. Price. Either way you want to cut it is fine.

[The information follows:]

Funding Rate of Advanced Technological Education

The table below shows the proposal and award figures for the Advanced Technological Education (ATE) program for FY 1994-97. The funding rate for the ATE program during this period was 32 percent. If it is assumed that for FY 1999, the overall number of high quality proposals received and the average award size are similar to the levels that prevailed over the 1994-97 period, in order for the FY 1999 ATE program funding rate to increase from 32 percent to 40 percent, an estimated $4.4 million of additional funding would be required.

Fiscal year	New proposals received	New awards
1994	199	51

1995	128	51
1996	127	39
1997	143	48
Total, 1994-97	597	189

Effects of Increasing Funding for ATE

Dr. Williams. My sense is that by increasing the budget by $2 million, since we have really started this quite positively, this major effort in the community colleges with the very strong industry partners that you know well, I do not think the success rate would change very much.

We simply would fund more excellent proposals if we had an additional $2 million. So, it will take more than that. But, yes, I will provide it for the record.

Informal Science Education Program

Mr. Price. Well, we certainly are encouraged by the submission of more meritorious applications. That is a sign that the program is catching on. We certainly want to keep pace with that. We do not want the success rate to fall below the point where we are discouraging applicants or not really realizing the program's full potential.

Well, in North Carolina, of course, they are very keen on our community college system. We have a new president of that system, our former colleague in this body, Martin Lancaster from North Carolina's Third District.

He is off to a great start. We look forward to working with the ATE program in helping our system find ways to utilize this opportunity more fully and upgrade what we are doing in the area of technical training.

Let me just briefly--my interest also in the informal science education program, Mr. Lane. I know this is a program that has enjoyed great success over the years. I note though that your funding proposal for next year is basically a flat funding proposal right around the $36 million level.

I do not know if you have this figure on the top of your head, but if you do or if you do not, you can give it for the record. What is the funding rate for that program, for the informal science education program?

Dr. Lane. I am afraid neither Luther nor I know the answer to that on the spot. We will be happy to provide it for the record.

[The information follows:]

Informal Science Education Program

In FY 1997, the funding rate of the Informal Science Education (ISE) program was 35 percent; over the period FY 1992 to FY 1997, the overall funding rate for the ISE program has been 37 percent. Since 1992, museums have accounted for 47 percent of total ISE awards. Awards to media have accounted for 28 percent and awards to community-based and other organizations have accounted for about one-fourth of ISE awards.

Recent trends include more institutional collaborations on projects; projects that place more emphasis on science as a process;

emphasis on involving entire families in hands-on science activities; and more exploration of creative uses of interactive technology.

Fiscal year	Number of proposals submitted	Number of proposals funded	Percentage of proposals funded (in percent)
92	173	53	31
93	97	35	36
94	79	32	41
95	52	22	42
96	\1\ 126	53	41
97	97	34	35
Total, FY 1992-97	624	229	37

\1\ Because of a shift of submission dates, some proposals that would have been submitted in FY 1995 were submitted in FY 1996.

Outreach Efforts Through Informal Science Education

Mr. Price. Well, I do think that is an important program. It benefits millions of Americans who visit museums, aquariums, and science centers every year. Public television programming is supported.

It is an important outreach effort. I am not sure what went into your calculations as to the funding level you would request. I would like to know, and I think this subcommittee should know, the rate at which you are able to fund meritorious proposals in this area.

Dr. Lane. We certainly would provide that. I would like to add the comment that with regard to these success rates, across the Foundation I think I used earlier the figure of 30,000 proposals, 10,000 awards.

That is a rough number, but the numbers in the thirties in terms of success rate describe quite well a whole range of our programs in terms of what constitutes a competitive program.

With regard to Informal Science Education, our view is that increasingly this really ought to become more a responsibility of all of the people we support, the laboratories, the individual investigators, the centers, than perhaps it has in the past.

There are some outstanding examples where some of our research centers have marvelous outreach programs. It may be that we could do more to build on that. In general, I just wanted to make the comment that I think in the spirit of more civic scientists, civic engineers, we really need for all of our researchers to be more involved reaching out to the public, to the children, helping with the K-12 systems, but more broadly working with communities in the way that you have described are so important.

Matching Funds for ISE Grants

Mr. Price. Yes, and interpreting what they do.

Well, in terms of funding, you are already requiring matching funds; are you not, for all of these ISE Grants? This is not solely Federal funding.

Dr. Lane. That is correct.

Mr. Price. Thank you. Thank you, Mr. Chairman.

Mr. Lewis. Thank you, Mr. Price.

I appreciate my colleagues being patient with the Chair. I have noted before with this particular agency, the National Science Foundation, we do not just get excellent testimony, we also get excellent attendance.

We have gone one round now with the Committee and it has taken a full two hours which is really unusual in the Committee. It is evidence of the interest on the part of the Members, but also the importance of the subject matter.

Having said that, there are many questions that we are not going to get to in a formal way. As I have indicated in the past, there will be a number of questions for the record. We certainly would appreciate your responding with similar interest, as well as diligence.

Human Resources Development

Mr. Lewis. We mentioned earlier that this will be Mr. Stokes' last hearing with NSF at any rate. One of the areas where he has played a significant role in stimulating the interest of the Chairman, but I also think other Members as well, involves what has happened with our 22 agencies and commissions for which we are responsible.

Attempting to bring into focus the reality that it is one thing to talk about opportunity across the country. It is another thing to insist upon opportunity within our Federal government.

So, I am interested, Dr. Lane, in your responding to some of those questions that come under the general title of affirmative action. How NSF is doing as it relates to the employment base, not just in general, but especially at higher levels of employment; those people who are at executive level appointed positions, but also at the higher scales of income.

Dr. Lane. This remains a very important issue for us at the Foundation and a great challenge, I would say at the same time. In the last several years or so we have put in place, a task force reporting to me in the area of human resources development.

That organization is to address internal and external issues having to do with under-representation. Dr. Bordogna chairs that task force for me. He is, in fact, aggressively pursuing a number of recommendations that we think will help us improve our representation at all levels within the Foundation. I would like to ask Dr. Bordogna if he would just give a couple of examples of the kinds of things we are trying to do here.

Mr. Lewis. Yes, Dr. Bordogna.

Encouraging Diversity

Dr. Bordogna. We are focusing on human resource development across the board. So, we are trying to be inclusive

here. We address the interest we have in the context of the whole instead of a separate issue.

That is one thing that has happened. We are trying to pull it together so we can benefit from the resources generally. Another sort of intellectual approach to this is since the world is so complex, we talked about that a lot this morning and increasingly so.

With technology, in order to get anything done for the good of society, you have to bring members to the table from diverse points of view. When you have a very complex situation, you have to make a judgment at the end on how to do it.

There is no exact solution and having people at the table with diverse intellect is very, very important. This is a notion in which we divorce it a bit from the difference in ethnic origin, color and so on. We say diversity is important intellectually.

Unless we really invest in that, the Nation is not going to prosper. Again, these are notions in which we are trying to get the investment in a way that is not as challenging as it is as much as it is right now.

As an example, you generously appropriated money to us this year for enhancing infrastructure through minority serving institutions, and also for graduate education for under-represented minorities.

There was $6 million and $5 million, respectively. It is a lot of money. Rather than use it just in isolation to the task at hand, we have decided to synergize that with a number of issues.

Equity in the University

One issue is that in order to really resolve the issue of equity in the university, it is good to have the university faculty represent equity. So, we would like to see a faster pace of producing graduates who can make the pool larger from which universities attract their professors.

With this $11 million, there are two big pieces. The minority served institutions with their infrastructure have got to pay attention to ensuring that the students they graduate are interested in and know about research and graduate careers. On the graduate education part of it, there will be funding to hopefully produce a hundred new Ph.D.s with that money. A part of the money is being used to influence universities to be pro-active in attracting and retaining the students once they get them.

Alliances for Minority Participation

Another part of this, which is money from a different part of NSF, is the Alliance for Minority Participation Program, which has been successful in producing more baccalaureate graduates.

Let us take advantage of that now and link it with this other $11 million. We create a pipeline here which is directed very specifically at having the graduates we are enabling through the baccalaureate to go into the Ph.D. programs and form a bigger pool from which universities can select faculty.

This is a very strategic move here. That is the kind of thinking we are doing in this group which I chair to synergize all of the NSF funds in some way, in everything we do to enable all of this to happen.

Mr. Lewis. Thank you, Dr. Bordogna.

Issue of UnderRepresentation

Dr. Lane. We need to address, at all levels, the issue of under-representation. It means that we are going to have to become more successful, become more aggressive with our efforts in K-12 education and with our efforts in graduate education and undergraduate education which your committee, Mr. Chairman, has helped us with. We are doing everything we can to be more inclusive in our advising structure, our review panels, and our advisory committees, in hopes that we can then coax some of our scientists and engineers who get involved with NSF in that way to be willing to come to the building and spend a year or two, or maybe a career as program officers, as division directors, as assistant directors.

We must attack this serious problem on all fronts. We are very pleased to have brought to our office Dr. Wanda Ward to work with Dr. Bordogna to try to implement the strategies that he has described.

Wanda Ward is African-American and has been an important contributor to NSF's education efforts for a number of years, and a very important addition to our office.

Mr. Lewis. We are getting close to the end of the rule. It looks as though we will be having a vote or maybe be stuck on the floor for awhile. I am worried about the time here and the number of questions.

Our panel does tend to expand on their responses as well. So, if we could cut back the time that each of us uses, Mr. Stokes, I had intended to use five minutes in the combination of my question and otherwise took almost ten. So, that reflects the problem.

Please, you proceed with that or whatever else you would like.

Workforce Diversity

Mr. Stokes. Thank you very much, Mr. Chairman. Once again, I appreciate the leadership that you have given over the years in terms of the issue that you have just raised with Dr. Lane and Dr. Bordogna.

This, of course, is a very important area. Of course, even though I will be leaving at the end of this term, and of course, Dr. Lane, you will also be leaving; it is important that the Foundation knows and understands the importance of this issue.

It is so important, Mr. Chairman, that you in particular raised this question and keep it highlighted in the sights of this committee as well as the Foundation. Let me just pursue it, if I can, a little bit.

In terms of the Foundation itself, how well are you doing in terms of the placement of minorities in the Foundation before we start trying to go out and tell others what they

should be doing?

You have to sort of set the example yourself. Can you give us some idea of any progress being made within NSF of finding and retaining and even promoting minorities?

Dr. Lane. Mr. Stokes, to be candid, not nearly as well as we would like to be doing. I could give you just an example of some results, but we could also submit some more details for the record in various categories of employees and various minority groups on how we are doing.

In the summer, at the end of September 1997, we had a total of 356 individuals employed in professional occupations with the Foundation; of course, our whole work force is about 1,100. Of those, 356 are considered in professional ranks. That was a decrease of six employees from the previous year in the professional category. In comparison, there was a slight increase in the relative percentage for all racial and national origin categories, except among white employees. So, the direction is toward a more diverse population in our professional work force.

I could provide some details with individual numbers for the record to show how significant these results are.

Mr. Stokes. That would be helpful if you would expand upon it in the record for us.

Dr. Lane. Yes, sir.

[The information follows:]

Work Force Diversity at NSF

In FY 1998, the NSF work force consisted of 1,338 Federal employees and Intergovernmental Personnel Act employees. The total permanent work force population was 1,100. The following table shows a profile of the NSF permanent work force by race and national origin for fiscal years 1996 and 1997, as of October 1 of each year. During this period, the overall minority work force decreased by the same one percent as the non-minority work force.

NSF PERMANENT WORK FORCE

	FY 1996	FY 1997
Black	407	401
Hispanic	19	19
Asian American/Pacific Islander	38	39
American Indian/Alaska Native	2	2
Minorities, Total	466	461
White	647	639
Total, Work force	1,113	1,100

The professional work force population decreased by six, from 362 in FY 1996 to 356 in FY 1997. Of the 356 professional employees, 54 (15%) were minorities and 302 (85%) were non-minorities. The following table shows the professional work force profile for fiscal years 1996 and 1997.

NSF PROFESSIONAL WORK FORCE

	FY 1996	FY 1997
Black	30	30
Hispanic	6	6
Asian American/Pacific Islander	16	16
American Indian/Alaska Native	2	2
Minorities, Total	54	54
White	308	302
Total, Work force	362	356

minorities and graduate degrees

Mr. Stokes. We will look through and really study the picture more carefully. Dr. Bordogna made some comments referencing the situation I had a particular interest in.

We look at the fact that blacks account for only about 3 percent of the master's degrees awarded in math and science, only about 2 percent of the doctoral degrees, and a recent issue of Chemical and Engineering News paints a similarly dismal picture.

According to the American Chemical Society Survey, only 2.2 percent of the Ph.D. chemists and chemical engineers are black. That is compared to roughly 30 percent who are Asian.

Of course, when you look at the whole picture, I saw a recent article that said blacks represent 11 percent of the U.S. work force. Only 1.1-percent are physical science doctorate holders, 1.3 percent of engineering doctorates, 1.4 percent of computer mathematical science doctorates.

The picture is extremely, extremely dismal. In light of the fact that we do not seem to be making very much progress, I have some concern about what are we really doing to improve this situation?

integrating underrepresented minority issue in all NSF programs

Dr. Bordogna. I would like to continue with the discussion. We sort of started with some of my previous answers. The big issue here is that we strategically believe you just cannot do this by having an investment in a certain piece of what we are doing. We would like to have the whole NSF investment impact this issue. I will give you two examples. One is that we have a new program called Integrative Graduate Education and Research Training Program, IGERT.

It is very important. It is an experiment in how to fund a new kind of Ph.D. education. Along with that particular intellectual focus, there is another intellectual focus and that is, we want grantees to pay attention to the under-represented minority issue.

A part of the IGERT proposal has to address this issue. Thus, we have embedded the under-represented minority issue in

a regular program. The leading team at NSF, the Assistant Directors, in particular, in their daily work, whatever they do, across the more than 3 billion dollar budget, keep this issue at the front of their minds. That is one specific example.

Another is that mentoring is important. We now recognize this. It is how the real work gets done. It is the one catalytic person idea: one good mentor helps solves many problems. There is a Presidential award for mentors now. We have been through two years of that program, with 20 awardees. We have formed them into a group to help us move ahead on these kinds of issues. The major issues I am trying to convey are: One, the Chief Operating Officer of NSF chairs the issue now so it is at the highest level, with the assistant directors in full support;

Two, we brought Wanda Ward in, a very capable, special person, to spend 24 hours a day on the issue to make sure that we toe the mark on it. And we have changed the way we recruit people inside NSF to make NSF different.

The major strategy is trying to use the entire investment of NSF to attack the issue, not just pieces of it.

Mr. Lewis. We have to go to vote. I know that Mr. Frelinghuysen has at least one question he wants to ask and I would presume that the Gentle Lady might, also. Since we are not going to be coming back this afternoon, I am kind of pushing this.

Mr. Stokes. I will yield back, Mr. Chairman. I will have additional questions which I will submit for the record.

Mr. Lewis. Mr. Frelinghuysen.

national institute for the environment

Mr. Frelinghuysen. Thank you, Mr. Chairman.

Dr. Lane, in last year's committee report language there was a direction to the Foundation relative to establishing a National Institute on the Environment. The Committee, ``directed the Foundation to study how much, how it would establish and operate such an institute, including the potential cost of an institute and report to our committee by today.'' Is that report done?

Dr. Lane. Mr. Frelinghuysen, the report is in final stages of development. We have been working extremely hard on that report. I do not have it today, but I expect to have it up here very soon.

We have also discussed this matter with the Board because it is a very important policy matter and the Board has issued a statement of principles on the NIE. Of course, our report will be consistent with the Board's statement. Could I ask Dr. Rubin to comment on that?

Mr. Frelinghuysen. Let me get into the record that I understand that both Congressman Saxton and Congressman Abercrombie wrote in a more recent letter to you, ``Congress clearly directed the NSF to prepare a report as to how it would incorporate an NEI, not whether it would do so.''

I think a number of us are concerned that this is a very slow process and Members' concerns and this committee's direction are not being considered. Dr. Rubin.

NSB resolution on NIE

Dr. Rubin. The National Science Board has made a resolution which was approved by the Executive Committee on March 16th. The resolution has four statements. The first outlines the NSF's legitimate role in fundamental research and environmental research, a role which the NSF is very pleased to have and hopes to, in fact, expand, and the resolution also recognizes the importance of environmental research.

The resolution states that NSF can most constructively exercise its leadership role in an inter-agency framework, coordinated by the White House. We recognize the role that NSTC has played in specific environmental issues.

We think this is something that can be done well with the leadership of the White House. We think that a separate entity, a separate organization, would not be an effective means of achieving the intellectual goals, partly because if such a structure were incorporated within NSF, it would duplicate existing NSF policies and management structure, and actually increase costs. The entire resolution can be placed in the record.

[The resolution follows:]

[Page 92--The official Committee record contains additional material here.]

Mr. Frelinghuysen. Something will be coming to our attention that relates to the Committee's directive.

Dr. Lane. Yes, sir. I stand by my earlier statement. We have taken this very, very seriously. We wanted to ensure that the report we deliver to this committee indeed is responsive to your request.

Mr. Frelinghuysen. Great. I expect it very soon.

[The information follows:]

[Pages 94 - 115--The official Committee record contains additional material here.]

Mr. Frelinghuysen. Thank you, Mr. Chairman.

Mr. Lewis. We have about a little more than five minutes before we vote. Ms. Kaptur.

national priorities for research

Ms. Kaptur. Yes, Mr. Chairman, I just wanted to thank the panelists again and to say that I have particular interest in the area of manufacturing, in the transfer of knowledge to the industrial sector.

I have been on the Committee long enough to remember NSF was not looking at that. Now you are. That is wonderful for the country. We encourage you in those efforts.

Secondly, the area of serious mental illness and the work

that is being done in mapping the brain and trying to understand the functioning of the human brain. We do a lot for our country and for the people who are suffering from these incredible illnesses. I would encourage you along those lines.

Then in the area of agriculture, I just wanted to say that I am very interested in any work you are doing or considering doing taking a look at the level of population growth in the world, in the next century, and what is happening to our arable lands globally.

In this country, we lose about 1.5 million acres a year of what we could term prime irreplaceable soils. I think any work in this area is a gift to the future. I would encourage you along in the work that you are doing there in the environmental sciences.

closing remarks

Mr. Lewis. Thank you very much, Ms. Kaptur.

To my colleagues, one more time, I appreciate your patience relative to our schedule today. Nonetheless, I had intended to spend some time dwelling upon the Inspector General and the role of Inspectors General within all of my agencies.

There is not going to be time to do that today. I hope that you share with Dr. Colwell that on an ongoing basis the Committee is going to be exercising that area relative to the role that IGs play in our ability to oversight our committees. So, it is an important message.

From there, Dr. Lane, we look forward to continue to work for you in another venue. My hat is off to you for the work that you have done. Dr. Rubin, it is a pleasure to be with you today as well.

With that, I must say that the Committee will adjourn until Tuesday, April 21st, when we will convene in our other room in the Capitol, H-143. Thank you.

[Pages 117 - 410--The official Committee record contains additional material here.]

I N D E X

National Science Foundation

	Page
Budget Priorities	53
Centers Collaborating with Industry	60
Collaboration with Department of Education	58
Congressional Support of Science	51
Distribution of NSF Funding	73
Extramural Research	72
Funding Received by Top 20 Universities	75
Industry and R&D	61
Interactions with Industry	60
Knowledge and Distributed Intelligence	69
National Institute for the Environment	90
Needs for Technological Training	74
NSB Resolution on NIE	91
Outreach Through Advisory Committees	79
Partnerships with Industry	58
Priorities for FY 1999 Funding	53
Priorities for NSF's Budget Request	52
R&D Funding for Universities and Colleges	73
Reviewing Priorities for NSF Budget	54
Technology Revolution	75
CISE	
PACI Partners	69
Partnerships for Advanced Computational Infrastructure	68
Transferring Data at PACI Centers	69
GEO	
Human Aspects of Natural Disasters	71
Hurricane Research	72
Hurricanes and Earthquakes	69
US Weather Research Program	70
EHR	
Advanced Technological Education Program	79
Alliances for Minority Participation	87
Closing Comments on Rural Education Efforts	65
Education and Human Resources Development	54
Education Efforts in Rural Areas	64
Education Initiatives	61
Effects of Increasing Funding for ATE	83
Enabling Teachers	66
Encouraging Diversity	86
Equity in the University	87
Focus on New ATE Centers	80
Funding Rate of ATE Program	83
Higher Education in the United States	67
Human Resources Development	86
Informal Science Education Program	84
Integrating Underrepresented Minority Issue in All NSF Programs	90
Issue of Underrepresentation	87
K-8 Mathematics Initiatives	62

K-12 Education..... 55
Master Teachers..... 66
Matching Funds for ISF Grants..... 85
Minorities and Graduate Degrees..... 89
NSB Task Force on Math and Science Achievement..... 57
Outreach Efforts Through Informal Science Education..... 85
Partnerships for Advanced Computational Infrastructure..... 68
Proposals for Rural Education Activities..... 63
Reevaluation of EHR Directorate..... 56
Request for Rural Systemic Initiatives..... 63
Resources for Education in Rural Areas..... 64
Scientists and Engineers as Resources in the Schools..... 67
Statewide Systemic Initiatives..... 62
Workforce Diversity.....88-89